https://doi.org/10.1007/s11467-022-1243-5

RESEARCH ARTICLE

Correlation-driven threefold topological phase transition in monolayer $OsBr_2$

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Received July 22, 2022; accepted October 30, 2022

Supporting Information

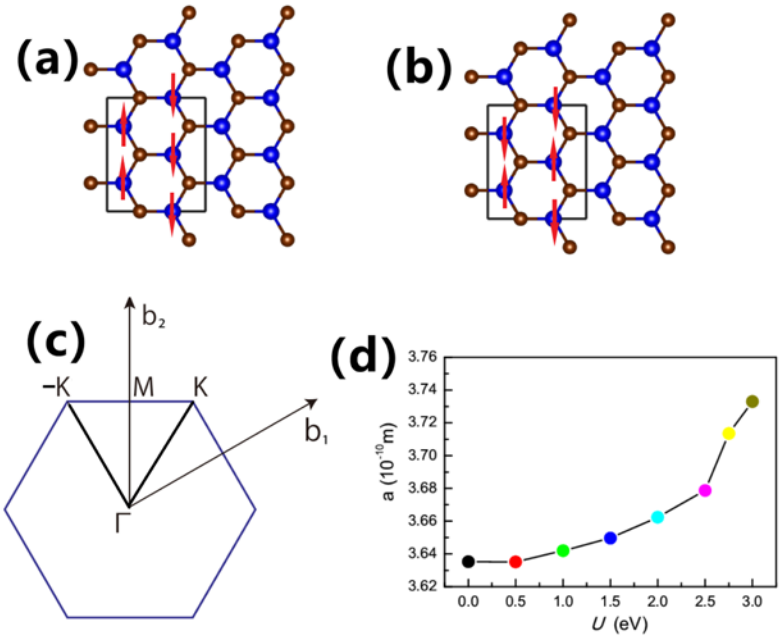

Fig. S1 For monolayer $OsBr_2$, the supercell is marked by the black frame with the AFM1 **(a)** and AFM2 **(b)** configuration. **(c)** The BZ with high-symmetry points. **(d)** The lattice constants a as a function of *U*.

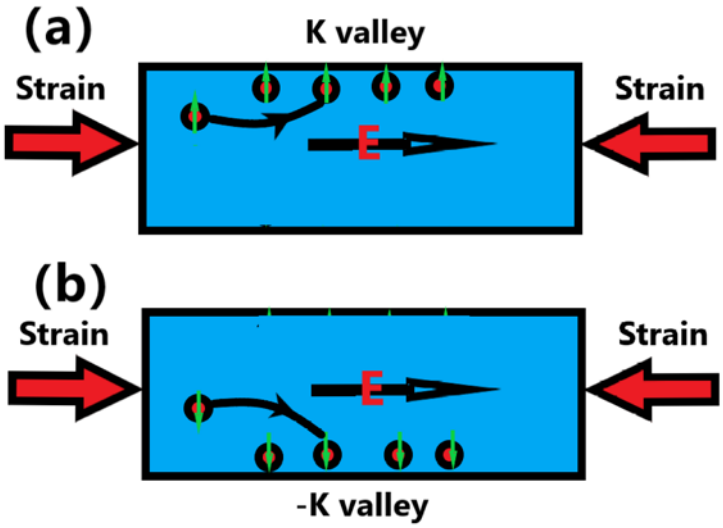

Fig. S2 Sketch of anomalous valley Hall effect, and the in-plane longitudinal electric field *E* is induced with uniaxial strain by piezoelectric effect. Upward arrows and downward arrows represent spin-up and spin-down carriers, respectively. The transition between -K and K valleys can be achieved by reversing the magnetization orientation of Os atoms.

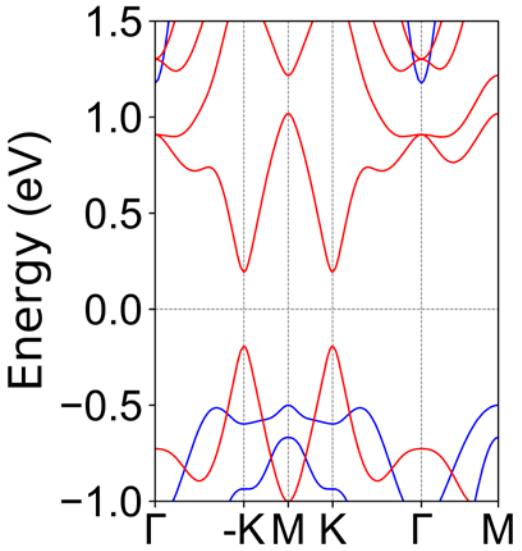

Fig. S3 For out-of-plane magnetic anisotropy, the band structure of monolayer $OsBr_2$ without SOC at U=2.15 eV. The blue (red) lines represent the band structure in the spin-up (spin-down) direction.

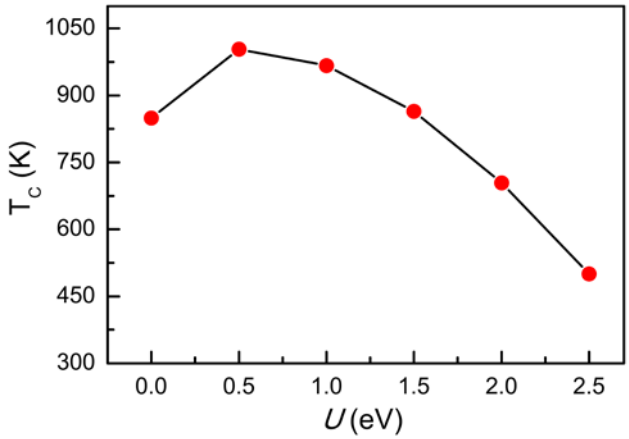

Fig. S4 For monolayer $OsBr_2$, the predicted TC as a function of U.